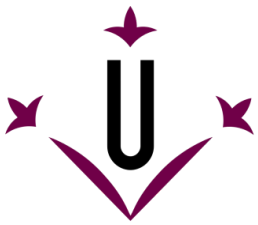

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LEARNING OUTCOMES OF "THE ONCOLOGY PATIENT" STUDY AMONG NURSING STUDENTS: A COMPARISON OF TEACHING STRATEGIES

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Summary

Introduction: Teaching strategies are a key element in the teaching process to facilitate meaningful learning and the development of high-level thinking skills in students. Objective: To compare three teaching methodologies (problem-based learning, case-based teaching and traditional methods) in terms of the learning outcomes achieved by nursing students. Method: This quasi-experimental research was carried out in the Nursing Degree program in a group of 74 students who explored the subject of The Oncology Patient through the aforementioned strategies. A performance test was applied based on Bloom's Revised Taxonomy. Results: A significant correlation was found between the intragroup theoretical and theoretical-practical dimensions. Likewise, intergroup differences were related to each teaching methodology. Hence, significant differences were estimated between the traditional methodology ($\bar{x}$ = 9.13), case-based teaching ($\bar{x}$ = 12.96) and problem-based learning ($\bar{x}$ = 14.84). Conclusions: Problem-based learning was shown to be the most successful learning method, followed by case-based teaching and the traditional methodology.

Introduction

The changing paradigm in nursing education is part of a continuous process of transformation in the university that is responding to current social and political requirements as well as to the realities of nursing itself. In the European context, according to the premises of the European Higher Education Area (EHEA), teachers face the challenge of coming up with new teaching strategies that have a favourable impact on the education of good professionals and citizens. We are searching for approaches that enable flexible and dynamic teaching that focus on the profession itself. At the same time we are open to a deeper development of knowledge by using different perspectives and methodology strategies while moving away from reductionist and simplistic education models and replacing them with postmodern models that aim to teach individuals to convert knowledge into personal experience rather than just accumulating knowledge (Mateo, Escofet, Martínez, & Ventura, 2009).

The true challenge lies in implementing a different method for developing new ways of teaching, including moving from an activity-centred teaching process to another process committed to the quality of learning. In other words, it is argued that we need to move from the instruction paradigm to the learning paradigm (Zabalza, 2011).

Previous literature

Teaching methodologies play a key role in responding to the needs of a changing academic setting because they are the element of the teaching-learning process that has the greatest impact on education (Zabalza, 2011). Teaching methodologies are defined as the methods and procedures that are used in the development of the teaching-learning process (De Miguel, 2006). Therefore, the teaching methodology is the strategy to be used in the teaching-learning process that the teacher chooses based on evidence and/or experience in order for the students

to develop certain pre-set skills. It is obvious that it not only determines what to do with the students but also the approach to be taken. Some academic changes have meant more of a "new academic architecture" than a "new academic culture" (Zabalza, 2011), meaning that some of the changes that have occurred are formal ones concerning administrative and organisational requirements, rather than innovations in teaching methods (De Miguel, 2013). As an example, some of the changes are based on the distribution of credit load and relocation of some subjects within the curriculum, in other words, not very significant changes that do not affect the educational paradigm.

The scarce tested information available on teaching principles and educational requirements that justify the changes in methodology proposed by Bologna has increased attitudes of distrust and rejection in many universities who suggest it is promoting teaching methods that do not belong in university teaching (De Miguel, 2013). Current studies on the Bologna Process in different universities warn that teaching methodologies used in the EHEA are not focused solely on learning and practice, but that it is still shaped by the traditional paradigm based on rote learning and the accumulation of knowledge (Cano, Berbén, Fernández, Gea, & Diaz, 2014). Therefore, we must continue aiming to adopt new teaching methodologies that allow for the application of active learning in which students develop and reconstruct deep knowledge (De Miguel, 2006); while at the same time boosting their motivation (Baeten, Kyndt, Struyven, & Dochy, 2010). It is encouraged by the principle of learning by doing, in which students really learn what they practise accompanied by feedback and reflection processes (Dewey, 2004). In this case the learning is not directly imposed, but rather the student builds it through activities that are developed at an academic level (Biggs, 2005).

According to Zabalza (2011), the different methodology types focus on four elements: the way in which information is delivered, the organization of space and time, the focus and management of the learning activities and interpersonal relations. In spite of the different classifications, there are seven methods structured from these four elements: lecture method or master class, case-based teaching, exercises and problem solving, problem based learning (PBL), project-based learning, cooperative learning and learning contracts (De Miguel, 2006). An analysis of the different methods allows us to describe the lecture method or master class as the closest to the traditional or standard paradigm: the teacher chooses the information to be transmitted to the student, the student remains passive, the professor performs the role of the expert and the students only acquire data and information. The remaining methods are closer to the reflective paradigm: the students are the protagonists, the methods are more investigatory and the goals are understanding and good judgement as opposed to a degree of knowledge that appears ambiguous and equivocal (Lipman, 1998).

The master class is shown to be a passive method, although it turns out to be excellent for delivering information to students and providing a summary of subjects with extensive bibliographies or gaps while acknowledging the lack of control over the assimilation of knowledge, lack of feedback and deep consolidation of knowledge (Sánchez, 2010; Zabalza, 2011). The traditional method emphasises memory, classroom learning and the position of power of the teacher (Chan, 2013). Despite the problems mentioned, there are studies that show students performing better (Schwerdt & Wuppermann, 2011). The participative master class is currently recognised in the search for developing reasoning in students through questioning (Sánchez, 2010).

Both PBL and case-based teaching are considered active teaching methodologies. Under PBL, the teacher presents a situation with multiple challenges to a group of students who have to then solve it autonomously. During the solving process they will have to search for, understand, analyse and integrate information related to the presented problem. Therefore, PBL is a dynamic, creative and effective teaching-learning strategy that is centred on the student, who actively learns in a context of collaborative work to solve a problem (Waterkemper & do Prado, 2011). Several studies (Carvalho & Oliveira, 2011; De Castro et al., 2013; Kantar & Massouh, 2015;Mendes, Martins, Oliveira, Silva, & Vilaça, 2012; Olivares & Heredia, 2012; Waterkemper & do Prado, 2011) have shown the theoretical and practical abilities and competencies such as critical thinking, diagnostic judgment, and attitudes and values related to the nursing practice that this methodology develops. However, regarding the development and integration of knowledge, the results are not as conclusive. Some argue that less knowledge is acquired, although, given the strategy used for the management of information, it is more likely to be remembered (Dochy, Segers, Van den Bossche, & Gijbels, 2003).

Case-based teaching is based on the discussion of a case in which students, both individually and in groups, carry out a deep and comprehensive analysis. Moreover, this approach includes presenting a question and checking available information. This methodology, when implemented, enriches the learning atmosphere of the classroom by favouring the integration of theory and practice, the development of critical thinking, group interaction and individual reasoning (Mendoza, 2006; Waterkemper & do Prado, 2011). In line with the PBL methodology, the objective of case-based teaching is not focused just on solving the case, but on student learning and the development of generic competencies such as synthetic and

analytic reasoning, information management, problem solving and decision making (Benito & Cruz, 2007; Maldonado, Vásquez, & Toro, 2010).

While both are active methodologies that, on the surface, seem very similar, they present significant differences in relation to how situations are characterised and approached and the sequence of procedures in the classroom (Benito & Cruz, 2007).

Nursing is a practical science and consequently students demand constant connections between theory and practice from instructors, thus allowing them to apply the learned knowledge to real situations. Both PBL and case-based teaching are equipped for this knowledge transfer because they encourage contextualised learning based on complex clinical situations and the use of evidence-based practices to optimise patient care (Applin, Williams, Day, & Buro, 2011; Waterkemper & do Prado, 2011). In addition, students admit to being more motivated when teachers use these methodologies (De Castro et al., 2013; Mendes et al., 2012; Penjvini & Shahsawari, 2013). However, it must be emphasised that simply instituting a specific teaching methodology is no guarantee for success. It must be optimally implemented for it to be truly effective (Schwerdt & Wuppermann, 2011).

To achieve meaningful learning, two chief factors have to be taken into consideration: student motivation and an existing cognitive structure that allows for the assimilation of knowledge. For the second element, the use of learning taxonomies acts as guides for classifying and planning teaching. The taxonomy is based on the fact that learning generally takes place in stages of increasing complexity. A high quality teaching methodology or strategy is what stimulates student work across different cognitive levels (Vásquez, 2010). The use of Bloom's Revised Taxonomy (Anderson et al., 2001) allows the teacher to establish the degree of accommodation to new learning. Its structure is organised upon a matrix of

progressive complexity in which thinking skills are categorised and ordered from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS). According to this approach, it is significantly easier to apply something when it is understood. Moreover, creating something requires an existing capacity for evaluation, which in turn is possible because it can be broken down into parts and analysed.

Lastly, evaluation is an element that is inextricably linked to the teaching-learning process, therefore, changes in teaching approaches and methodologies are associated with changes in evaluation (De Miguel, 2013). The use of rubrics is put forward as one of the alternatives for evaluating learning and it is increasingly widespread in the education system in Spain. The rubric is an evaluation guideline using a preferably closed matrix where performance is graded using scaled text boxes (Cano, 2015). The rubric allows for addressing the different elements of a teaching guide: learning skills and results, methodology and evaluation. It provides greater understanding of the evaluation for the teaching staff and the students (Cano, 2015) by enabling an evaluation practice directed at learning through feedback between their current situation and their stated goal (Sáiz & Bol, 2014).

Following this framework, teachers propose innovation projects, but to truly make decisions about changing teaching methods, rigorous research is needed to provide verified data about the extent of the improvement in students' learning.

Objective

To compare three teaching methodologies (PBL, case-based teaching and traditional methodologies) using a performance test to evaluate the learning outcomes of nursing students with the Bloom's Revised Taxonomy. This evaluation took place once the training for the subject "oncology patient care" ended.

Methods

Research Design

A quasi-experimental cross-sectional analysis of a single post-test for three randomised groups was performed.

Context

This educational intervention was carried out with second-year students in a nursing degree programme in a Spanish school of health sciences, within the area of Clinical Nursing.

Participants

The study consisted of 74 students out of the original group of 77. These were divided into three experimental proportional randomised subgroups. From this list of students, a computer programme was used to randomly distribute the students.

After the experiment had started, three students were excluded because they had not finished all of the credits needed for the subject. Two of the students were from the traditional group and one was from the PBL group. The final distribution of the students participating in the subgroups and evaluated on the subject of patient oncology was as follows: 25 in the PBL group, 26 in the case-based teaching group and 23 in the traditional methodology group.

Intervention

In order to compare the three strategies, an intervention was carefully planned to evaluate students' nursing care for patients receiving oncological treatment. This area was chosen under impact criteria for the high percentage of oncological disease, the complexity of the nursing care and the educational value for improving understanding and later transfer of knowledge. Three thematic areas were created: chemotherapy, radiation treatment and others

(immunotherapy, bone marrow transplant). The educational intervention had four phases of development: exploration (review of literature on teaching methodologies to implement for decision making), planning (design and action plan in the classroom), implementation in the classroom and evaluation (analysis and interpretation of the results).

The implementation phase was carried out over an academic semester. The work sessions in the three groups were programmed weekly and included both onsite (2 hours) and independent (4 hours) work.

The traditional methodology sessions were conducted through lecture classes with audio-visual support. The PBL and case-based teaching study groups' modules consisted of four sessions: two onsite and two remote for three modules (one for each thematic group). The 7 Step Method (Sola 2006) was adapted for the PBL group and the design from the Instituto Tecnológico y de Estudios Superiores de Monterrey, (n.d.) was adapted for the case-based teaching group. The teaching materials (problem-situations and cases) had been used and tested in a previous study on the basis of educational value, impact, frequency and priority (Zapico & Montenegro, 2007).

Data collection: Tool

To compare the three teaching methodologies on the basis of the learning outcomes achieved by the students, the data were collected through a criteria based and anonymous written performance test (the criteria used was defined in the rubric). The test was made up of two open-ended essay questions: the first question aimed at obtaining more theoretical input, while the second question required students to provide an answer based on theoretical reflection and the expression of the possible causal relations that guide such decision making during nursing procedures (see Table 1: essay question and dimension). The test was

evaluated using a numerical grade between 0 and 10 in each one of the two dimensions, which is consistent with the standard rating scale in Spain.

Table 1- The performance test combined with elements of the assessment rubric

It is important to add that another assessment rubric was created to evaluate the learning level achieved (see Table 1). The structuring of this assessment rubric followed progressive complexity levels in accordance with the previously mentioned Bloom's Revised Taxonomy, (Anderson et al., 2001). This allowed for the evaluation of learning based on the complexity and structural organisation of the students' answers. Therefore, the theoretical dimension is related to low levels of thinking skills, such as remembering and understanding, whereas the second dimension is associated with medium and high level thinking skills, such as applying, analysing and evaluating. We believe that the last level of complexity – creating – cannot be addressed through a test since a good outcome in the second question is subject to the nursing evidence published in clinical practices guidelines and other documents and not in the creation of new procedures or care.

The test and assessment rubric were designed by the teaching team that led the intervention. The evaluation was performed by three experts: an expert nurse in the area of oncology care and two nurses with extensive careers in nursing care and teaching. The test was also given to two students with similar characteristics to the profile group (students in the advanced nursing programme) as a pilot test to evaluate their comprehension.

This test was performed at the end of the first semester, in January 2013, once the training on care of cancer patients had finished. It was taken by the students in the three intervention

subgroups and corrected by the same teacher. The teacher was not able to identify the students or the group he/she belonged to, as the participants were identified by a code.

Data analysis

The descriptive statistical analysis is presented using the analysis of the resulting grades for each part of the test, in terms of pass/fail and the level of mastery, according to the particular teaching methodology. Likewise, ANOVA hypothesis testing was performed to analyse the differences between different methodologies using SPSS 2.0.

Ethical considerations

Informed consent from the participants was requested, and the confidentiality of the data was guaranteed throughout the whole process. This study is part of a wider project that was assessed by the Health Care Ethics Committee located at the Santa Maria Lleida Hospital.

Results

The performance test was completed by a total of 74 students. The age of the participants ranged from 18 to 32 years. With regards to gender, there was a greater percentage of women (78%) than men (22%), the numbers being 58/16. As to studies prior to entering the nursing programme, we observed that 43 of the students or 58% came from A levels, 25 students or 34% had previous studies in the area of health and 6 students or 8% had unrelated studies. In all cases, the composition of the subgroups did not vary significantly for any of the sociodemographic variables (see Table 2).

Table 2- Sociodemographic Variables and Composition of the Subgroups.

There may be other contributing factors with regard to the overall group profile. Neither prior grades nor previous experience with any of the teaching methodologies was considered for the organisation of the subgroups. Nevertheless, in this respect, the fact that all of the participants had greater experience with the traditional methodology may play a role since, in case-based teaching and PBL, a "newness" factor cannot be discounted that could have affected the performance in the subgroups using the newer methodologies. However, this could be counteracted by the students in the traditional subgroups' greater ability to understand what is expected of them.

The same could be applied to the teacher, who, despite having more experience and mastery of the traditional methodology, may have influenced the results given their commitment to new methodologies

In terms of the overall grades obtained in the test, it is interesting to note that all students from the PBL methodology passed, while four students from the case-based teaching and ten from the traditional methodologies groups failed.

Table 3- Average grades, percentage and absolute frequencies for dimension 1 (Theoretical) and dimension 2 (Theoretical-practical) by group according to the teaching methodology.

Table 3 shows the results according to each type of methodology and dimension. In relation to Dimension 1, which refers to the theoretical question, the total amount of students that met the level of remembering and understanding are counted. The students showed evidence of remembering and understanding the concept of extravasation, including the ability to link it to other related aspects such as: contextualisation, symptomatology depending on the type of drug or discernment when facing other potential problems present in intravenous therapy.

For Dimension 2, which refers to the theoretical-practical question, students who were able to apply, analyse and assess the knowledge were considered to have passed. This means that those who demonstrated the knowledge to activate the procedure protocol and partially or completely finish all of the required nursing procedures through a nursing care plan.

Important differences are seen in terms of the theoretical dimension. Nearly twice as many students in the PBL (24 students or 96%) and case-based teaching (23 students or 88%) groups reached the conceptual comprehension level than in the traditional method group (13 students or 57%). Similarly, in the theoretical-practical dimension, the results are much better for the students approaching the subject through PBL than the traditional methodology. In this case, higher percentages are found in the second level, *analyse* (13 students or 52%), and the third level, *evaluate* (7 students or 28%). In the case-based teaching study group, most of the students are distributed between *apply* (11 students or 42%) and *analyse* (10 students or 39%) while in the traditional methodology a majority of the students only reached the first level in *apply* (19 students or 83%). It should be remembered that these categories are based on taxonomic levels and therefore progressive. We understand that the student that reaches the *evaluate* level, although not reflected in the earlier categories, is also capable of analysis and application.

If we observe in detail the amount of students that attained the highest level, we find important differences between the three groups. Table 3 describes the grade averages for each group for the two dimensions (theoretical and theoretical-practical), showing that the most favourable outcomes occurred in the PBL group, followed by the case-based teaching group and the traditional methodologies group, thus confirming the results achieved so far.

A graph (Figure 1) with the profile of the groups according to the total percentage of students that reached each of the taxonomy levels was created. To this end, the grades have been converted into dichotomous variables that relate to each level in the following manner: "Reaches the level = 1 and Does not reach the level = 0", for each of the levels.

Figure 1 – The percentage of students who reached each taxonomic level

The results displayed in Figure 1 confirm that there is a correlation between the outcomes in the theoretical and theoretical-practical dimensions. The correlation is of 0.517 and is moderate and significant ($p < 0.01$), which explains how the achievement of a theoretical-practical level is related to the appropriate usage of the theoretical level.

To perform the analysis, we have assigned a nominal category depending on the result of each variable stemming from the rubric on the one hand and from the grades on the other. We categorised performance as low, emerging, medium or high (Table 4).

Table 4- Interval and category assignment of grades

Figure 2 represents the different variables and their categories using a scatter plot. It shows a clear association between the PBL strategy and the highest outcomes. In the case-based teaching strategy, the strongest association exists with the middle category, and a slight association exists with the emerging one. Finally, the traditional teaching methodology is associated with the emerging and low level outcomes. The low grades for the theoretical question do not seem to be associated with any particular methodology.

Figure 2 – Correspondence analysis

We found significant differences between the subgroups' averages (F 16.054 sig. 0.000) using an analysis of variance (ANOVA) of one factor to add the grades in both questions, which means the total grading is a dependent variable. Using Scheffé's test as a contrast of the post hoc multiple comparison, we found significant differences between the traditional methodology ($\bar{x}$ = 9.13) and the active methodologies, PBL ($\bar{x}$ = 14.84) and case-based teaching ($\bar{x}$ = 12.96). When conducted separately, the same trend occurs in the grade analysis of the theoretical and theoretical-practical dimensions.

Methodological rigour

As in every study in the educational field, it is impossible to control intervening variables as well as certain elements that may influence findings. However, the results presented in this work are framed within a wider project that included the analysis of the variables of the process that resulted in the same findings. Therefore, we believe that this is a solid basis for assuming the validity of the conclusions.

Along these lines and because the teacher is considered one of the determining variables in the process, the work was planned in natural groups instructed by the same teacher, something that we believe strengthens the results. This approach is recommended for future similar studies aimed at replicating our results.

Discussion

The findings of the present study suggest that PBL and case-based methodology appear to favour the development of higher order thinking skills in students, allowing nursing degree students to be able to not only apply knowledge but also to analyse, evaluate and in higher stages, create it. There are several studies in which the assessments of the students reflect the excellence and suitability of the PBL model as a generator of meaningful learning. This is

especially true with regards to its capacity for facilitating knowledge transfer, an important element in nursing because of its practical nature (De Castro et al., 2013; Granero, Fernández, Castroz, & Aguilera, 2011; Mendes et al., 2012). Both PBL and case-based teaching are considered active teaching methodologies that originate from problematic situations that make the students face real-life scenarios (Ribeiro & Gomes, 2012) while facilitating the development of professional skills (Kantar & Massouh, 2015). Other studies with nursing students, however, show that the development of skills in clinical practice and training do not seem to be affected by the use of different learning methodologies during the theoretical training, and there is no an impact on the grades obtained in the clinical internships or *practicum* (Alcolea, Oter, Martínez, Sebastián, & Pedraz, 2012). Most of the divergent elements regarding PBL are found in aspects such as the lack of coordination, work overload and overlap with traditional methodologies (Granero et al., 2011) rather than the methodology itself. Therefore, detailed planning of the implementation of a teaching methodology while paying close attention to variables like coordination within the curriculum, teaching skills and a careful management of the activities (space, time, teacher and student dedication) enables the achievement of positive results as described in the study by Schwerdt and Wuppermann (2011).

There appears to be an increase in knowledge (De Castro et al., 2013; Kang, Kim, Kim, Oh, & Lee, 2015) and motivation when comparing the use of PBL and traditional methodology among the nursing students trained using the PBL methodology (Penjvini & Shahsawari, 2013). Moreover, PBL methods allow for the socialisation of knowledge, even though students question group learning from the perspective that it requires greater dedication of time (Rodríguez et al., 2014). Research shows that this development of knowledge has a

positive effect on the students' grades (Dochy et al., 2003; Khatiban & Sangestani, 2014), and in lower rates of failure and absenteeism (Latasa, Lozano, & Ocerinjauregi, 2012).

The students achieve better grades when they use approaches aimed at developing deeper thinking skills instead of superficial skills, thus proving the paramount importance of the educational context (Gijbels, Van de Watering, Dochy, & Van den Bossche, 2005). The focus on deeper learning approaches developed through Bloom's Revised Taxonomy (Anderson et al., 2001; Bouchard, 2011), prioritises the HOTS before the LOTS. In other words, in deeper learning. The critical analysis of information is not only useful to understand knowledge but also to apply and evaluate that knowledge. By contrast, superficial learning does not go beyond knowing and remembering.

In traditional methodology, students perform adequately at the lower levels of thinking such as remembering and understanding and only some show ability in application. Therefore, its usefulness and benefits must be acknowledged for the development of less complex thinking (Sánchez, 2010). Finally, traditional methodology does not allow for the advancement of an educational situation where all of the factors (the students, teachers, methodology and the atmosphere) can interrelate according to the premises of the European Higher Education Area (EHEA). This evidence suggests the need to implement new teaching strategies in the classroom that entail a conceptual change informed by a constructivist learning framework (Morales, 2009).

CONCLUSION

The complexity of health care situations and the speed at which situations change in the nursing context require highly trained nursing professionals with excellent educational organisation based on meaningful learning. For these reasons, we believe that useful

activities comprising the Higher-Order Thinking Skills aiming at competency development should be reinforced.

Educational innovation, aside from the fact that it is promoted by the resolutions of the Bologna process, is still an element of interest for teachers in charge of generating and managing learning spaces. It is important to stress that learning outcomes are a result of a method and must be accompanied by a theoretical perspective, or theories of knowledge, in a guided and systematised process together with consistent and constant reflection.

One methodological aspect should be highlighted: the use of assessment rubrics to obtain useful grading in the field of educational research. The design of a good grading assessment rubric lies in the validity of its content, which makes them an excellent instrument to gather information in performance tests in addition to their implementation as an alternative option to evaluate learning.

In conclusion, we emphasise that our analysis provides evidence that among the three implemented methodologies in the classroom, the one with the best outcomes in the two evaluated dimensions (theoretical and theoretical-practical) was PBL, followed by case-based teaching and, finally, the traditional methodology.

Conflict of interest

The authors have not manifested any conflicts of interest.

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